

aqueous solution to acidulate it and to form lactic acid therein and cations from said aqueous solution are bound by said cation exchanger to form a cations-carrying cation exchanger;

b) simultaneously recovering lactic acid from said lactic acid-containing acidulated aqueous solution; and

c) reacting said cations-carrying cation exchanger to convert it into a cation exchanger which is at least partially in its acid form and to a second product, which second product is basic and comprises the cation of said salt.

REMARKS

The Official Action of December 5, 2000 has been carefully considered and reconsideration of the application as amended is respectfully requested.

Claims 1 and 34 have been amended to delete the phrase to which the Examiner objected at paragraph 1 of the Official Action. These claims have also been amended to make changes of a cosmetic nature. In particular, in claims 1 and 34, the preamble term "aqueous solutions" has been changed to -- an aqueous solution-- to assure correspondence with the term appearing later in the claims. In addition, an inadvertent typographical error has been corrected in claim 34. A marked-up copy of the claims is attached to locate amendments.

The Examiner has rejected claims 1 - 34 under 35 USC 1003(a) as allegedly being unpatentable over Glassner et al (EP0393818) in view of Walkup et al (U.S. Patent 5,252,473).

This rejection is respectfully traversed.

On page 3 of the office action the Examiner has characterized the difference between the claimed invention and that of Glassner et al. However, Applicants respectfully submit that there is a more significant difference between the claimed invention and that of Glassner. As can be seen from Glassner claim 1 and the specification of Glassner, the patent teaches the use of “water splitting electrodialysis to convert the lactate salt to a corresponding base and a lactic acid stream”. In step d of the Glassner process, the lactic acid stream (i.e., not a lactate salt solution as claimed) is treated with a strongly acidic ion exchanger.

By contrast, the claimed invention requires the recovery of lactic acid from an aqueous solution containing at least one water soluble lactate salt wherein a cation exchanger is utilized to convert the salt in said solution to an acid and a base. This is in contradistinction to the teachings of Glassner wherein an electrical current is used to convert the salt to an acid and a base and the acidic ion exchanger is used to treat the lactic acid stream.

As can be seen, e.g., from the description on page 5 of the Glassner patent, ion exchange is taught therein for “polishing of the lactic acid process stream” (page 5, line 52). Similarly, as stated in Glassner at page 5, line 47, “after the water splitting electrodialysis, residual cations, ions and amino acids remain in the acid process stream” (page 5, lines 47 and 48).

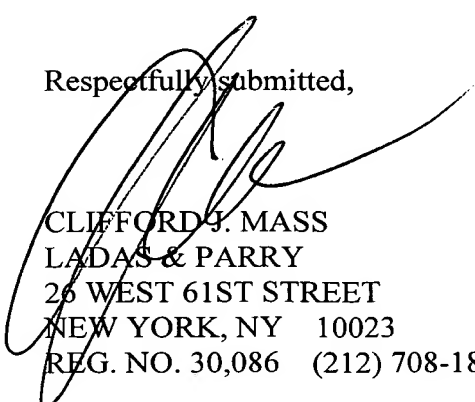
Thus it is clear from the above, and as stated in the Glassner abstract, the Glassner patent teaches and suggests a process relating to “lactate salt in an aqueous stream which is subject to water-splitting electrodialysis to form base and a lactic acid product.”

Since the Glassner patent neither teaches nor suggests a process wherein a lactate salt in an aqueous solution is formed into a base and a lactic acid product without electrodialysis, this patent cannot be considered, either alone or in combination with the cited secondary reference, to set forth even a *prima facie* case of alleged obviousness for the claimed process.

It is to be noted that the teachings of Walkup cannot supplement the deficiencies in the primary reference. Walkup does not suggest the characterizing features of the claimed invention and does not fill the gap left by the absence of teaching in the Glassner patent. Neither the carrying out of hydrolysis in the presence of CO₂ nor the features of distillation attributed to Walkup could motivate those of skill in the art to modify the Glassner process to arrive at the process claimed in claims 1 and 34 now on file. Therefore the claims as presently drafted are both novel and nonobvious over the combined teachings of the cited references.

In view of the above, all rejections and objections of record are believed to have been successfully traversed and the application is believed to be in allowable form. An early Notice of Allowability is earnestly solicited and is believed to be fully warranted.

Respectfully submitted,



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1. (amended) A process for the recovery of lactic acid from an aqueous solutions containing at least one water-soluble lactate salt and having a pH of about between 4 and 14, comprising the steps of:

a) contacting said aqueous solution with a cation exchanger which is at least partially in its acid form, said cation exchanger being water immiscible in both acid and salt form, whereby ion exchange is effected, protons are transferred from said cation exchanger to the aqueous solution to acidulate it and to form lactic acid therein and cations from said aqueous solution are bound by said cation exchanger to form a cations carrying cation exchanger;

b) reacting said cations carrying cation exchanger to convert it into a cation exchanger which is at least partially in its acid form and to a second product, which second product is basic and comprises the cation of said salt; and

c) recovering lactic acid from said lactic acid-containing acidulated aqueous solution ~~by methods known per se.~~

34. (amended) A process for the recovery of lactic acid from an aqueous solutions containing at least one water-soluble lactate salt and having a pH of about between 4 and 14, comprising the steps of:

a) contacting said aqueous solution with a cation exchanger which

is at least partially in its acid form, said cation exchanger being water immiscible in both acid and salt form, whereby ion exchange is effected, protons are transferred from said cation exchanger to the aqueous solution to acidulate it and to form lactic acid therein and cations from said aqueous solution are bound by said cation exchanger to form a cations-carrying cation exchanger;

b) simultaneously recovering lactic acid from said lactic acid-containing acidulated aqueous solution ~~by methods known per se~~; and

c) reacting said cations-carrying cation exchanger to convert it into a cation exchanger which is at least partially in its acid ~~form~~ form and to a second product, which second product is basic and comprises the cation of said salt.